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Filed: 09/18/2003

REMARKS

In the detailed Office Action it is noted that the oath or declaration is defective, as it does not identify the mailing address of each inventor.

Accordingly, a new declaration, properly identifying the inventors' mailing addresses, in compliance with 37 CFR 1.67(a) identifying the application by application number and filing date is provided.

Claims 1-14 are pending in this application.

Claims 1-14 are rejected.

In this office action claims 1, 2 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Drinkwater (US 6,712,399).

The Office Action states that regarding claim 1, Drinkwater discloses an optical structure in the form of a security document (Fig. 1) comprising:
a light transmissive substrate 3 having a first surface (bottom) and an opposing second surface (top), the second surface having a surface relief pattern 4 formed thereon;
a patterned layer 5 of reflective material applied onto portions of the surface relief pattern 4 of the substrate 3, such that some portions of the surface relief pattern are covered by the reflective material, and other portions are exposed;

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and an optically active coating 6 underlying the patterned layer 5 and exposed portions of the surface relief pattern 4 (lines 8-26, 32-41, 52-57, col. 4).

Regarding claim 2, the optically active coating 6 is said to be colored i.e. it has color shifting optical properties (lines 52-53, col. 4).

Regarding claim 13, the surface relief pattern 4 is a holographic image pattern (line 23, col. 4).

The applicant has amended claim 1 to more clearly distinguish over Drinkwater, referred to hereafter as the '399 patent.

The '399 Drinkwater patent is directed to using a color layer between Al demetallized regions of a hologram with an obscuring layer between the substrate and the hologram. This colored layer also produces a color that is angle insensitive to viewing, hence, it stays the same color at all angles of viewing. By logical deduction we can state that the colored layer is transmitting otherwise the use of the obscuring layer would not be required. This can be gleaned from the '399 specification at Col. 2, lines 52-59 where it states that "Preferably, the obscuring layer is substantially continuous. This has the advantage that the entire underlying surface of the substrate onto which the security device is provided is obscured...".

Drinkwater teaches that the obscuring layer may be continuous or discontinuous by way of having a plurality of sections. The '399 patent also teaches that the sections may

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have the same or different colors by using one or more pigments to color the sections.

Notwithstanding, in contrast, the instant invention provides a color-shifting layer, which is itself opaque by way of being formed of one or more Fabry-Perot cavities having a foil or reflector, or the color-shifting layer may be based on an ink that is opaque thereby not requiring a continuous or discontinuous obscuring layer.

The instant invention provides a combination of two interference devices, one based on holographic or diffractive means and other based on thin film interference whereby the two interact to form modified color shifts with viewing angle. In the instant invention the color shifts can move either to higher or lower wavelengths as the angle of view increases depending on the design of the diffractive surface and thin film used.

In contrast, the '399 Drinkwater patent has no "optically active" color shifting coating in layer 6 wherein the color changes with respect to viewing angle or angle of incident light. The claims in the instant invention have been amended to more clearly define this optically active coating as a color-shifting coating which has a visible color shift with change of viewing angle or angle of incident light.

Claims 1-2, 7, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Walters (US 5,742,411), referred to hereafter as the '411 patent.

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The Walters '411 patent teaches a structure realized by combining a hologram with a transmissive aluminum layer with an opaque demetallized layer wherein the pattern of opaque Al is amplified by means of a relief structure of micro prisms in the form of retro-reflectors situated below the opaque demetallized Al pattern. A substrate (layer 107), is inserted between the hologram and the Al metallized pattern. When the hologram is illuminated with a focused beam of bright light, an image reflected from the partially metallized micro prism layer is visible.

In the Office Action, the Examiner has suggested that layer 107 in the Walters '411 patent is an optically active coating. The applicant respectfully disagrees with the Examiner's interpretation, since layer 107 is a polyester or vinyl material; the layer is therefore not optically active and is most certainly not color-shifting with a change in viewing angle. It is the Applicant's view that amended claim 1, which now specifically defines the optically active layer as a color-shifting layer having a varying color with a change in viewing angle, is patentable over the teachings of Walters in the '411 patent. Walters does not teach or suggest using a color-shifting layer together with a hologram or grating.

With regard to claim 7, the Examiner correctly points out that in the exposed portions of the surface relief pattern optical effects of the surface relief are not visible since both layers 101 and 107 of '411 have essentially the same refractive index; that is they are index matched. Notwithstanding, claims 7 and 14 of the instant invention are directed to index matching for another reason; the applicant's invention allows the color shift with angle from the color

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shifting ink to show through the demetallized spaces without the effect of diffraction.

In summary, it is believed that amended claim 1, and dependent claim 7 and 14, are patentable in view of the '411 patent.

Claim 14 has been amended to more clearly define the optically active coating.

Claims 1-2, and 14 are rejected under 102(b) as being anticipated by Mallik (US 5,411,296), referred to hereafter as the '296 patent.

The '296 patent teaches a method to produce a security device that brings together side by side reflective holograms or one or more holograms one on top of another. One or more of the holograms are demetallized in order to allow visualization of the other holograms through the intervening spaces.

The Examiner cites Mallik against claims 1-2 and 14. Amended claim 1 of the instant application now defines a structure having a patterned relief structure such as a hologram together with a color-shifting coating wherein the color changes with angle of incident light. The applicant is in agreement with the examiner that portions of the structure in the '296 patent have index matched areas (layers 119 and 125) rendering that the optical effects of the surface relief are not visible in the exposed portions of the surface relief pattern. Of course the idea of index matching in and of itself is well known.

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The instant invention, however, claims index matching an ink vehicle with color shifting properties with viewing angle on the exposed portions of the demetallized layer so that the diffractive pattern does not interfere with the colors of the color shifting ink with viewing angle. In these areas it is desired to have just the effects of thin film interference arising from the optically variable platelets in the ink vehicle. Claim 7 dependent on amended claim 1 now more clearly defines a structure producing this effect.

Claim 14 of the instant application has been amended as is indicated above and now distinguishes the applicant's invention from all of the cited prior art.

Claims 1, 7 and 14 are now believed to be patentable over Mallik.

Claims 1-4 and 9-13 are rejected under 35 U.S.C. 102 (e) as being anticipated by Kay, US 2004/0100707, referred to hereafter as the Kay '707 application.

The '707 Kay patent application is directed to providing a demetallized hologram with two different reflecting metals. The metals used are copper and aluminum although other reflective metals (Paragraph 15) may be used. These metals may be placed side by side in contact with the relief structure, be deposited one on top of the other, a high refractive dielectric may be placed between the aluminum and the copper. This patent teaches using the two different reflectivities so that different areas of the hologram will be modified with an "angle invariant color" so that to the eye one area of the hologram appears different to the other. Alternatively, one

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could use the structure to form a capacitance structure, which can be detected electronically.

Within the '707 specification there is no disclosure that one can combine diffractive (holographic) interference with thin film interference as taught and claimed in the instant application which allows one to modify the colors of the rainbow hologram differently at different angles of view. i.e. angle dependent color filtering.

The structure taught by Kay in the '707 application has several limitations. First, when two metals are in contact, especially when exposed to moisture, a galvanic current will occur that will corrode the metals.

Furthermore, Kay's design can be copied rather easily. A demetallized hologram can be readily duplicated by the many counterfeit holographic laboratories around the world. Using a dye over an aluminum reflector would give a similar effect i.e. modifying the reflection hologram relative to that using only aluminum. Standard metallizers that can evaporate copper are also at the counterfeiter's disposal.

Thirdly, the use of copper is a poorer reflector than aluminum and in those areas of the copper, the hologram will appear very dark in color. In contrast, our structure is bright in both regions since one region is aluminum and the other one is based on the reflection characteristics of a Fabry Perot filter that uses aluminum as its reflector.

The aluminum layer is now defined in applicant's amended claim 2.

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In this Office Action, claim 2 has been rejected in view of Kay.

Regarding claim 2, the Examiner indicated that Kay has color shifting properties because layer 5 is copper. Copper has no color shifting properties where the color changes with viewing angle. Claims 1 and 2 have been amended to more clearly define this feature.

Regarding claim 3, the Examiner states the optically active coating taught by Kay is a thin film stack comprising layers 7, 5 and 6. The Applicant respectfully disagrees with this statement. There would be no color shifting colors with viewing angle with this structure as viewed from layer 7 down to layer 6. Layer 6 is an adhesive layer, which is too thick to be considered as an interference layer forming part of an optical stack. A dielectric layer on Cu would not provide visible color shifting properties with viewing angle.

Regarding claim 4, the Examiner states that the thin film includes a partially absorbing/partially transmissive layer 6, a dielectric layer 7 and a reflector layer 5. The applicant would like to clarify that layer 6 is an adhesive that plays no role in an optical stack based on interference technology as taught in the instant application. Layer 6 would be much too thick to function as a component in an optical stack; and certainly there is no teaching or suggestion of optical stack with color shifting properties with viewing angle.

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Regarding claim 9, the Examiner states that the A1 is opaque and is patterned as in layer 4 in '007 (Kay). The Applicant agrees.

Regarding claim 10-12, the Examiner states that the Kay patents discloses pictorial designs, alphanumeric designs and graphical designs. Although Kay may disclose such designs, the designs of the instant invention as claimed reside upon a different background of color shifting colors with viewing angle, providing very different and desirable optical effects. The structure and functionality of the applicants' claimed device is quite different that that taught by Kay, and it is believed that the amended claims reflect this.

With regard to claim 13, although Kay may teach a holographic image pattern he does not provide the structure necessary for the pattern to change color with angle of incidence. Furthermore, there is no mention at all of such a feature or effect in the Kay application.

In view of the above, it is believed that claims 1-4 and 9-13 are patentable after consideration of Kay.

Claims 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mallik in view of Phillips (US 5,424,119). It is said in the Office Action that Mallik discloses all of the limitations of the above claims except for teaching that layer 125 contains flakes that add colorful optical effects to the exposed portions of the surface relief pattern 123. It is further suggested that it would have been obvious to add Phillips' flakes in Mallik's security document.

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One cannot simply use hindsight to say such a combination would have been obvious. There is simply no hint or suggestion in Mallik that he considered utilizing flakes in combination with his hologram in the manner as claimed, let alone optically variable pigment to produce a hologram "floating" on a color shifting background where the color changes with viewing angle. Furthermore, there is no suggestion in Phillips or Coombs to use a holographic layer with their color shifting features. The claimed invention provides this synergistic effect which none of the prior art suggests may even be possible. From reading any of the cited references there is no suggestion of realizing such a combination or its superb optical effects.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mallik (US 5,411,296) in view of Phillips (US 5,424,119) and further in view of Coulter (US 6,150,022).

Claim 6 defines an optical structure as defined in claim 5, wherein the flakes are a thin film optical stack including:

- a partially absorbing/partially transmissive layer;
- a dielectric layer; and
- a reflector layer.

There is no evidence that Mallik contemplated using color shifting flakes as defined above with a diffraction grating or hologram. He certainly did not disclose the Applicant's claimed structure. Neither is there any evidence in Coulter et al ('022) that Coulter considered putting optically variable flakes in a resin next to a demetallized layer of aluminum. Coulter does not suggest such a combination in his specification.

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In summary, Phillips and Coulter do not teach or suggest using their flakes in this manner.

This synergistic combination defined by the claimed structure of this application provide effects that are more than the mere sum of the individual parts. The resulting structure provides the appearance of having a hologram "floating" on a color shifting background where the color changes with viewing angle.

As for the previously filed IDS considered by the examiner on March 20, 2005, it appears as if the non-patent art submitted by way of an information disclosure statement by Applicant, is not present in the USPTO file.

Accordingly, Applicant re-submits the NON PATENT LITERATURE DOCUMENTS attached hereto for consideration.

Moreover, Applicant notes that foreign patent reference DE 43 43 387, submitted with the Information Disclosure Statement on February 12, 2004, has not been considered by the Examiner for lack of an English translation. Accordingly, Applicant submits an English translation of the German patent publication, attached to this response.

In view of the foregoing remarks and amendments to the claims, it is respectfully submitted that the instant application is now in condition for allowance.

Early and favorable reconsideration of the Examiner's objections would be appreciated.

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Applicants request confirmation of consideration of the IDS previously mailed to the U.S. Patent and Trademark Office on March 18, 2005.

Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees, to Deposit Account No. 50-1465 and please credit any excess fees to such deposit account.

Respectfully submitted,



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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: MAIL STOP AMENDMENT, COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450, on this 20 day of June, 2005.

